NSRP 0456

FINAL REPORT

STANDARDS DATABASE MAINTENANCE

Submitted to

Newport News Shipbuilding
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16. Abstract

The objective of this project was to develop an updated compendium of standards (from international, national, military, and regulatory bodies) that have relevance to the U.S. shipbuilding and repair industry. This project was intended as a follow-on to NSRP 0361, but the timing was such that it is an essentially new database that has standard titles, numbers, issuing organization. Each title is assigned a Ship Work Breakdown Structure (SWBS) number to facilitate cross referencing. The intended benefits are to provide shipyards and related marine industries with a ready reference to standards that are of use to shipbuilding, and to eliminate the development of new standards where acceptable standards exist.

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TABLE OF CONTENTS

I. FOREWORD

This report is a product of a program directed by the National Shipbuilding Research Program (NSRP) and the Ship production Committee (SPC) of the Society of Naval Architects and Marine Engineers (SNAME). This particular research project was sponsored by the Office of Naval Research (ONR). Newport News Shipbuilding was the prime contractor, with the University of Michigan Transportation Research Institute (UMTRI) working under a subcontract.

Under the SPC Panel SP-6 proposal, the technical objective of this project is to maintain and expand a compendium of standards (international, national, military, and regulatory) that have relevance to the U.S. shipbuilding and repair industry. The intended benefits are to provide shipyards with a ready reference to standards that are of use to shipbuilding and to eliminate the development of new standards where acceptable standards exist.

The project was performed at UMTRI by Albert W. Horsmon, Jr. and Scott B. Clapham. Richard C. Moore was project director.

II. INTRODUCTION

Standards are key elements in the efficient design, construction, and repair of ships and vessels in all shipyards. As a result, there is a continuous need by many designers, engineers, managers, and other people associated with marine work to reference standards from a wide range of regulatory bodies, government agencies, technical societies, and private industry groups.

Traditional methods of locating standards center around referencing many documents and books of standards issued by diverse individual organizations. Copies of the standards on microfiche reduce the volume of the references but not the difficulty in searching for information. Computerized versions of the standards made searches faster, but frequently give users more information than they need for initial investigations. This can be not only time consuming, but may result in either not finding a standard or developing a new standard where a suitable one may already exist.

As a result, Panel SP-6 of the Ship Production Committee of SNAME identified the need for a computerized compendium of standards pertinent to shipbuilding and ship repair. The development of the initial Computerized Compendium of Standards was completed as NSRP Project 0361 in December, 1992, but the maintenance of the database was not contracted for until October, 1994. Therefore, this database is essentially new. The purpose of this report is to describe the updated standards database and its development.

Section III describes the previous standards compendium projects, some of their limitations, new requirements for a standards Compendium based on industry need, and the goals of this project.

Section IV describes the main tasks of this project. The first task was to research new marine standards and sources and to incorporate them into the database. The second was to produce electronic copies of the Compendium and User's Manual in a variety of formats to facilitate transfer to industry.

Section V summarizes the final results of the project including some size parameters of the final database, which information is included, which information is not included, uses for the database, and details of some of the major standards types included (commercial, government, ABS, international).

Section VI presents conclusions of the project with corresponding recommendations for future action.

Finally, the References and Appendix contain supporting information for this report, including a User's Manual.

III. PROBLEM DEFINITION

The first compendium for the NSRP was completed in September of 1979 under an NSRP Project titled "A Compendium of Shipbuilding Standards."[1] It was performed by Corporate Tech Planning for Bath Iron Works as a hard copy database with 2,580 entries, predominately from domestic agencies. It was issued in hard copy format, sorted by four methods, without provision for maintenance.

That project had three limitations. The first is that standards are added, deleted, and otherwise modified outdating the document. The second is the cumbersome nature of the hard copy format. The third limitation is that there was no provision for input from users.

The second compendium was completed in 1992 as the "Computerized Compendium of Standards"[2] and was distributed as a dBASE IV® file, overcoming the second limitation above. It was an index to the titles of many marine standards categorized by SWBS[3], standard number, and organization. The format was also adjusted to present the most commonly used information first as well as fields for additional information. It was expanded to include 10,379 standards from 50 organizations, both domestic and international. The third limitation of getting input from users was addressed by accepting feedback from industry during development. The addition of standards brought the database up to date in 1992. The SP-6 Panel recognized the need for maintenance of this database during the development phase of his compendium, but the follow-on project was not funded until nearly two years later. Thus, as standards changed, it became somewhat dated.

Although the 1992 project addressed many of the previous limitations, they were not completely overcome. This was the objective of the Database Maintenance Project. However, by the time the maintenance project was awarded, it became necessary for development of an essentially new database.

The intent of the Database Maintenance Project is not only to keep the standards presently contained updated, but also to expand their number and the scope of organizations included. To aid in distribution of the updated Compendium, it is offered in multiple software formats for both personal computers (PCs - IBM®[4] compatibles) and Macintosh® platforms. This should eliminate any software or hardware obstacles to its widespread usage in industry. This effort is part of a two-year effort, with the second year to be awarded.

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[1] NSRP 0088
[2] NSRP 0361
[3] SWBS - Ship Work Breakdown Structure. A systems-oriented structure used by the U.S. Navy to classify components from design through the life of the ship. A listing is provided as Appendix E.
[4] IBM is the registered trademark of International Business Machines.

IV. TECHNICAL APPROACH

The approach used to complete the project consisted of two main tasks.

The first task was to research information sources to find new standards not already in the Compendium. This began by requesting updated information from the organizations whose standards were already included in the previous compendium. These new lists were compared to the existing database. For organizations providing a limited number of standards, this comparison was done manually. For organizations with many standards the new lists were converted to electronic form and combined with the existing database. The database was re-sorted and duplicates were manually edited. This permitted quick comparisons of standards whose titles may have changed slightly, but that a computer duplicate check would miss.

In addition to ensuring the currency of the organizations already listed, the scope of organizations was increased. This was done by means of a mass mailing to standards organizations both in and out of the marine industry. Responses were entered into Excel® for the Macintosh® because of its ease in data entry. The Macintosh platform was used because of its ready availability at the University of Michigan. Once the standards had been entered the files were ported over to the MS-DOS compatible PC and imported into Access®. Standards held in the libraries of UMTRI, the College of Engineering, and the Rackham Graduate School were recorded and checked for applicability. Additional standards were found on the World Wide Web using a powerful home page search engine. Important standards were also recommended to the project by members of industry.

The second task was to produce the Compendium in a format that is easily used by shipyard personnel and is transferable to personal computers anywhere in an efficient manner. This involved an easy-to-follow User's Manual, explaining precisely how to install the Compendium, how to locate information easily, and where to call in case help is required. In addition, report formats were developed that would enable hard copies of searches to be printed quickly. Finally, a method of compressing the Compendium database files into an easily shipped form was required due to the volume of data involved. The PKZIP® software program was selected for this task. With one command (described in the User's Manual) all of the files can be loaded onto the user's computer in their original size.

After surveying industry members and evaluating software commonly available on the market, the database was prepared for export in a number of formats for easy distribution. These formats include dBASE IV®, Excel® (for both PC and Macintosh), Access®, and FoxPro®.

V. RESULTS

The final Compendium database contains over 17,000 standards from 70 different organizations. This represents a six-fold increase in size from the 1979 Compendium and a 60 percent increase over the previous computerized compendium. With the expansion in military standards, Coast Guard regulations, and foreign standards such as JIS, DIN, ISO, and BSI[5], the Compendium offers a much more complete reference source for shipyard personnel. Every standard record entry contains the organization acronym, standard number, descriptive title, and SWBS number. Thus, with the flexibility of the database software, searches can be run to find standards meeting a variety of criteria defined by the user. This is a significant improvement from both the original Compendium project and the 1992 effort.

The User's Manual, with a more detailed description of the Compendium and how to access it, is attached to this report as Appendix B. A Quick Reference Sheet is attached as Appendix C. A sample output from the database is included as Appendix D.

VI. FUTURE DEVELOPMENT

In order to make the Compendium an ongoing, usable tool, it will need to be maintained so that it reflects updated standards and references, new standards sources, and archiving of obsolete standards. Inclusion of standards abstracts is planned for an expanded version of the Compendium. Also, users will need support and specialized services, such as custom searches and ready access to hard copies of standards. In an effort to continually build the database, additional standards-generating organizations should be researched and added. Funding for continued maintenance and development of the Compendium will support these programs.

[5] JIS is Japanese Industrial Standards, DIN is Deutsches Institute fur Normung (Germany), and BSI is British Standards Institute. See Appendix A for full list of Organizations and Acronyms.

VII. REFERENCES

1. A Compendium of Shipbuilding Standards, NSRP 0088, 1979, Corporate Tech Planning for Bath Iron Works.

2. Computerized Compendium of Standards, NSRP 0361, December 1992, University of Michigan Transportation Research Institute.

3. Code of Federal Regulations Title 46. Parts 1-588.8, U.S. Government Printing Office, October 1990,.

4. Japanese Industrial Standards, Japan Marine Standards Association, September, 1992, Tokyo, Japan.

5. Classification of Ships 1994, Det Norske Veritas, Hovik, Norway.

6. American Bureau of Shipping Rules for Building and Classing Steel Vessels 1995, American Bureau of Shipping, Two World Trade Center, New York.

7. Navigation and Vessel Inspection Circular 0-95, U.S. Coast Guard, 1995, Washington, DC.

APPENDIX A

Organizations Comprising Compendium

Air Movement and Control Association	AMCA	
American Bureau of Shipping	ABS	
American Boat and Yacht Council, Inc.	ABYC	
American Gear Manufacturers Association	AGMA	NEW
American Iron and Steel Institute	AISI	NEW
American Society of Civil Engineers	ASCE	NEW
American Society of Heating Refrigerating and Air-conditioning Engineers, Inc.	ASHRAE	
American Society of Mechanical Engineers	ASME	NEW
American Trucking Association	ATA	NEW
American Wood Preservers Association	AWPA	NEW
American National Standards Institute	ANSI	
American Petroleum Institute	API	
American Society for Testing and Materials	ASTM	
Audio Engineering Society	AES	NEW
British Defense Standards:	Def-S MOD UK	
British Standards Institution	BSI	
Bundesam		
Canadian General Standards Board	CGSB	NEW
Canadian Standards Association	CSA	NEW
Chemical Fabrics and Film Association, Inc.	CFFA	NEW
Chemical Specialties Manufacturers Association	CSMA	NEW
Chinese National Standards	CNS	NEW
Civil Aviation Authority	CAA	NEW
Civil Engineering Data	CED	NEW
Conference Europeene des Administrations des Postes et des Telecommunication	CEPT	NEW
Copper Development Association, Inc.	CDA	NEW
Cordage Institute	Cl	NEW
Corps of the Engineers		NEW
Data Interchange Standards Association	DISA	NEW
Department of Defense	DOD	
Department of Labor	DOL	
Det Norske Veritas	DNV	NEW
Deutches Institute fur Normung	DIN	
Electronic Industries Association	EIA	NEW
Environmental Protection Agency	EPA	
European Committee for Standardization	CEN	NEW
European Committee for Electrotechnical Standardization	CENELEC	NEW
European Council/Commission Legislative Documents	EC	NEW
European Telecommunications Standards Institute	ETSI	NEW
Federal Controls Institute, Inc.	FCI	NEW
Federal Specification	FED-SPEC	
French Association for Standardization	AFNOR	
Germanisher Lloyd	a	
Grocery Manufacturers of America, Inc.	GMA	NEW
Heat Exchange Institute	HEI	
Hydraulic Institute	HI	
Industrial Fabrics Association International	IFAI	NEW
Institute of Electrical and Electronics Engineers, inc.	IEEE	
International Electrotechnic Commission	IEC	

International Radio Consultive Committee	ITU-R	NEW
International Telegraph and Telephone Consultative Committee	ITU-T	NEW
Illuminating Engineering Society of North America	IESNA	
Intergovernmental Maritime Consultive Organization	IMCO	
Insulated Cable Engineers Association	IPCEA	
International Organization for Standardization	ISO	
Japanese Industrial Standards	JIS	
Joint Industrial Council	JIC	
Joint Technical Committee	JTCI	NEW
Lloyd's Register of Shipping	LR	NEW
Maritime Administration	MARAD	
Marad Standard Specification	MASS	
Marad Standard Specification (Diesel)	MASSD	
Military Specification	MIL	
Manufacturers Standardization Society of the Valve and Fittings Industry	MSS	
National Electrical Manufacturers Association	NEMA	
National Fire Protection Association	NFPA	
National Institute of Standards and Technology	NIST	
Netherlands StandardsInstitute	NNI	
North Atlantic Treaty Organization	NATO	NEW
Oil Companies International Marine Forum	OCIMF	
Panama Canal Company	PCC	
Safety of Life at Sea	SOLAS	
Society of Automotive Engineers	SAE	NEW
Society of Naval Architects and Marine Engineers	SNAME	
Standards Association of Australia	SAA	
Standards New Zealand	SNZ	NEW
Steel Structures Painting Council	SSPC	
Suez Canal Authority	SCA	
Truck Trailer Manufacturers Association	TTMlA	NEW
Tubular Exchanger Manufacturers Association	TEMA	
Underwriters Laboratories, Inc.	UL	
United States Coast Guard	USCG	
U.S. Coast Guard Navigation and Vessel Inspection Circular	CGNVIC	
United States Department of Agriculture	USDA	
United States Navy	USN	
United States Public Health Service	USPHS	

STANDARDS COMPENDIUM DATABASE

USER'S MANUAL

APPENDIX B

Table of Contents

STANDARDS COMPENDIUM DATABASE
USER'S MANUAL

I. INTRODUCTION

Overview

The Standards Compendium Database has been developed and maintained to provide an up-to-date reference list of most existing marine-related standards. The database is intended as a resource to the shipbuilding, ship design, and related marine industries for standards that have been developed by various organizations to aid in boat and ship construction. Users will be able to locate standards of interest using an MS-DOS-compatible PC or Macintosh and the data disks provided by UMTRI. The Standards Compendium should be updated periodically to reflect changes in the current body of marine standards, as well as to enhance the system based on user input.

The database contains basic descriptive information of each standard (organization, title, that organization's standard number). It is also classified by SWBS[1] number for cross reference. There is sufficient information on each standard so that a user can determine if it is suitable for a given purpose. A user should then be able to determine whether it is necessary to reference a detailed standard.

Most major standards generating organizations have been included, both U.S. and international. See Appendix A for a list of the organizations included in the Compendium. In developing the Standards Compendium database, the 1979 National Shipbuilding Standards Program[2] database and the 1992 Computerized Compendium were used as references, with these standards being updated and new ones added. The basic database structure was kept intact and expanded.

The Compendium was developed using MS-DOS, PC-based database software. Alpha Four™, dBASE IV®, Microsoft Excel®, Microsoft Access®, and FoxPro® versions are available. A version in Excel® or FoxPro® for the Macintosh is also available.

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[1] Ship Work Breakdown Structure
[2] NSRP 0088
[3] NSRP 0361

Contents of the User's Manual

This User's Manual contains information to help new users of the Compendium install the database on their computers, learn how to find information quickly, print out reports, and locate help should problems arise.

Hardware and Software Requirements

The following are recommended minimum hardware and software requirements for the Standards Compendium.

* IBM PC compatible, at least a 286 with MS-DOS version 5 or higher
* 640K RAM
* Hard drive with at least 10 megabytes free
* 3.5-inch high-density disk drive
* Major database software programs such as dBASE IV®, Alpha Four™, etc.
* Dot matrix or laser printer (if printing is desired)

Note that the Compendium can be shipped in different database formats, depending on each user's requirements. Newer versions of most of the software will most likely require more capable computers. Upon request a Macintosh version can be supplied.

Data Included in the Database

In general, data in the Compendium have been obtained from the most recent versions of the standards available. Not all data field information is available for each standard. These fields were left blank, although there is a possibility they will be completed in a future revision of the database.

The following are names and descriptions of each of the data fields in the Standards Compendium:

FIELD	DESCRIPTION
ORGAN	Standards organization that originated the standard (see the listing in Appendix A of organizations included)
SwBS	Navy Ship Work Breakdown Structure number applicable to the standard
STD-NO	Standard number as assigned by the issuing organization
TITLE	Descriptive title of the standard
STATUS	Denotes if standard is known to be an inactive government standard as indicated by an "*". If the field is blank, the standard is most likely still in effect.

Notes on Military Standards

There were 4,632 military standards obtained for this Compendium. Most of these standards are primary first-level standards. There are a great many more standards "referenced by" these first-level standards. For example, a fuel-oil service-system standard may refer to a standard for copper-nickel piping, among many others. All the referenced standards may not be included in the Compendium. For government applications, these references are available through the Naval Sea Systems Command, NAVSEA, at 703-602-0179.

Where to Call With Questions/Problems

If you are having any problems with or questions about the Compendium, call the University of Michigan Transportation Research Institute (UMTRI) at 313-764-5308, FAX 313-936-1081, email: ahorsmon@umich.edu. Or, write to:

UMTRI
Marine Systems Division
2901 Baxter Rd.
Ann Arbor, MI 48109-2150

II. HOW TO ACCESS THE DATABASE FILE

General

The database will arrive on one 3.5" disk in dBASE IV version 1.5 format, or whatever other format was preferred. These notes are based on V.1.5. Similar steps should fit the other database programs. The first necessary task will be to make a backup copy of the database. This will protect valuable data in case of hard-drive or floppy-disk damage. Use the DOS DISKCOPY command with this format:

DISKCOPY A: A: (To copy using a one drive system with the same type of disk) or

DISKCOPY A: B: (To copy using a two drive system)

Note: It is important to number each of the copy disks (if you receive more than one disk) the same as the originals. This will help ensure that the disks are read onto the hard drive in the correct order.

Uncompressing the Files. Loading onto the Hard Drive

The Compendium will be sent to users in a compressed file format so that the database and all associated files can fit on one data disk. The database files have been compressed using the PKZIP.EXE program into one file called COMPEND.ZIP. In order to load the Compendium files onto the hard drive and restore them to normal size, it will be necessary to use the PKUNZIP command.

After making a backup copy of the Compendium disk, use the copy to load the database to the hard drive in your computer. It will be necessary to use the PKUNZIP command to uncompress (extract) the files and load them onto the hard drive. This program is included on the disk each user receives and can be run using the following command (at the DOS prompt):

B:\> PKUNZIP/D COMPEND.ZIP C:\COMPEND

In this example, the user has the Compendium disk in the B drive (on some computers tis will be the A drive) and is extracting the database files from the COMPEND.ZIP file into the COMPEND directory on the computer's C hard drive. (The user can name the directory by some other name if desired). The Compendium database can be put in any directory or subdirectory desired.

However, it would be a good idea to put the files in an easy-to-find location. Once the PKUNZIP command has been successfully completed, all of the necessary database files will be on the user's hard drive ready to access with the database program.

There will need to be at least ten megabytes of free space on the computer's hard drive in order to load the Compendium database and its supporting files. If there is insufficient space, options for obtaining more space include deleting obsolete fries to create more space, finding another computer with enough free space, or obtaining a larger hard drive.

Using Different Database Programs

The Standards Compendium was developed using Microsoft Access® database software program. However, the Compendium is supplied in dBASE IV®, Excel®, Access®, and FoxPro®. Other versions may be requested from UMTRI. The database files can be accessed with other database programs if saved in the correct file format. In either case, it will be possible to directly read the files with your database program without any file-conversion programs.

Problems with Accessing the Compendium Database

Upon successful loading of the Compendium onto the computer, it can be accessed simply by loading the database software program into memory and choosing MAIN as the active database fiie. If MAIN is not available as a choice, it may be necessary to change the default directory currently set up in the database software to C:\COMPEND (or whichever directory path the data files were moved to). The default directory is the location where the software program automatically looks to find files to load. This directory can be named whatever one wants. Most users choose an easy to remember name where they want all their databases to reside.

III. USING THE DATABASE TO LOCATE INFORMATION

This part of the manual uses the dBASE IV command language to describe search methods. Most database software programs use similar, if not identical, commands. The title of the command may be different, but usually the function is the same. Experienced database-software users will be able to use more advanced techniques tailored to their individual needs.

Assuming that the database program is loaded onto the computer hard drive, call it up using the appropriate command at the DOS prompt, (or if you are in the Windows environment, double click on the program icon). At the Control Center, the database, the queries, and the reports are available by command.

There are two ways to look at the Main database file. You can use the **Query** command at the Control Center or you can use the **Organize** command when editing data. We recommend using the **Query** command.

Searching the Database

There are a variety of ways to search the database depending on what information is being sought and how often the query will be required. dBASE IV is very flexible in letting users define queries using either very broad criteria or narrow search parameters. This section gives a general description of how to set up queries, as well as examples of some common queries that will be used with the Standards Compendium.

Each of the popular database software programs has flexible command structures for creating queries. Most programs allow a search for key words or character strings from one or more data fields concurrently. Also, it is usually possible to link different search criteria using logical operators such as AND or GREATER THAN.

For example, a query can be set up in dBASE IV to find all ABS standards pertaining to boilers with a standard number greater than 25. Remember the expression field must be enclosed in quotes. This would involve setting up three search criteria as follows:

CRITERIA	FIELD	OPERATOR	EXPRESSION
1	ORGAN	=	ABS
2	STD_NO	>	25
3	TITLE	$	BOILER

In the above, $ is a dBASE IV operator, which tells the program to search for any occurrence of the word *boiler in the* specified field.

Another simple, commonly used type of search is to find all records with the same entry in the primary index. For example, if the current query is by Organization (within dBASE IV), the **Find** command can be used to jump to the first SNAME record, for example. The user can then page through the records.

The searches that Compendium users will probably employ most of the time are:

1. Search for a specific standard number - possibly within a given organization.

2. Search for standards with a specific SWBS - possibly within a given organization.

3. Search for all standards related to one or several key words or expressions (for example, all standards related to Halon Systems).

Using the Query Command

1. Add Compendium to File Catalog
   This must be done to open the compendium and view its contents
   A. Pull down the **Catalog** menu from the top of the screen.
   B. Select **Add File to Catalog.** A window will appear on the right side of the screen with a list of directories.
   C. Locate the file **Main.DBF** in the tree.
   D. Double click on Main.DBF.

2. Double Click in the file **Main.DBF** under Data
   This will allow you to work with Main.DBF

3. Double Click on Display Data
   The unsorted compendium will then be displayed

4. Transfer to Query Design

This will allow you to tell dBASE how to sort the Compendium

A. Pull down the Exit menu from the top of the screen.

B. Select Transfer to Query Design. The fields of the compendium will then be displayed on a new screen.

5. Enter Search Criteria

A. Tab to desired field by which to sort

B. Enter search criteria. Shift+Fl provides a list of additional search keys.

1. If you wanted to find all standards with Halon in their title
   a. Tab to the Title field
   b. Type $"halon"
2. If you wanted to find SWBS numbers greater than 800
   a. Tab to the SWBS field
   b. Type >800

C. Press F2 once the search criteria have been entered. The list you desired will be displayed.

6. To Perform Additional Searches

A. Repeat steps 4 and 5 again.

Saving Queries and Query Results

Frequently accessed queries should be saved under a fde name for use in the future. Queries can also be saved as a new (mini) database. In dBASE IV, this can be done using the Layout menu and selecting Save this Query. If the query is needed again in the future, it can be retrieved at the Control Center.

Browsing Through Records

From the dBASE IV Control Center, begin browsing through records by using the F2 (Data) command. dBASE IV starts at the beginning of the database by default and shows multiple records at once. This is called the Browse mode, and will display each record on one line. It will still be possible to see other data fields within the record by scrolling to the right until the desired field comes onto the screen. To look at a single record at a time, press the F2 (Data) button, this will put you in the Edit mode. To go back to Browse mode (multiple records at a time) press the F2 button again. Using the Tab key causes the cursor to move

one field to the right at a time. Using the Shift-Tab key causes the cursor to move one field to the left. To scroll forward 17 records, use the Page-Down key, using the Page-Up key results in a backward scroll of 17 records.

Exporting Data from the Database

If necessary, records can be exported to another file in a selected database software format. This is done in dBASE IV using the Tools menu and selecting Export Data. here is a lot of flexibility in determining which fields and records are selected for export. One advantage to doing this is the ability to manipulate some of the data in another file without altering the structure of the original database.

IV. PRINTING REPORTS

Printing reports can be done in several ways. The Compendium is packaged with report formats already set up. To print, enter the Report menu and select the desired report format. Another way is to design a custom report using the software. This is of course, much more time consuming. However, it does afford a lot more flexibility in tailoring a report to specific needs. This section of the manual provides printer and hardware requirements necessary for printing, describes the available report formats, and briefly explains how to design reports using dBASE IV.

Hardware Requirements

dBASE IV, or any of the common database software packages, functions well with either dot matrix or laser printers. The software provides a menu of printers from which a user can select one that is compatible with his/her printer. Either letter size or wide computer paper can be used to print listings of standards. Both of the report formats provided with the Compendium are designed to fit on letter size paper. A desirable feature for printers is the ability to use "compressed mode." This is helpful when printing large listings of standards, so that more information can be fit onto a page.

Report Formats Available

In the dBASE IV version shipped to Compendium users, there are two report formats available to choose from. These were the listings assumed to be the most useful for the majority of users. Either format can be used to print a list of standards of any length. Below are descriptions of each:

1. Organization order
   This report lists the standards in alphabetical order of the originating organization. Within each organization, the standards are in ascending numerical order. The fields included are the ones expected to be of the most interest: ORGANIZATION, STANDARD NUMBER, STANDARD TITLE.

2. SWBS order
   This report lists the standards in ascending SWBS order with organization being the secondary sort. The fields included are ORGANIZATION, STANDARD NUMBER, STANDARD TITLE.

When ready to print, dBASE IV displays a Iist of report formats to choose from under the Control Center Report Menu command.

How to Print a Report

Printing a report is straightforward using one of the predefine formats in dBASE IV. Basically, this tells the program which fields to print, in what order on the page, and in which locations. Also, the format tells the program what to print on the top and bottom of the page for heading and summary information.

H a query has been made which is desirable to print the following will allow you to produce a hard copy.

1. Transfer to Query Design Screen from the Browse Screen
   - A. Pull down the Exit menu from the top of the screen
   - B. Select Transfer to Query Design

2. Save search results as a database
   This permits you to recall or print this select list of standards at any time
   - A. Pull down the Layout menu from the top of the screen
   - B. Select Write View as a Database
   - C. Provide a convenient name and description

3. Exit Query Design Screen and return to Control Center
   - A. Pull down the Exit menu from the top of the screen
   - B. You may abandon your work if you wish only to save the results of the search (they were saved in step 2-B)

4. Activate file you wish to print
   - A. Double click on file name under Data
   - B. Select Use File

5. Choose print format
   - A. Double click on the pre-saved report format you would like to us
   - B. Select Print Report
   - C. Select Current View

Creating a Custom Report

Printing does not have to be done using one of the predefine report formats. The software will allow users to design a report form. This usually involves more effort, but may be necessary depending on which fields are most useful, as well as what is the best order in which to print.

In dBASE IV, the basic command to use in setting up a new report is Reports, and then Create/Modify a Report. After the report has been set up, Save This Report should be selected from under Layout. You will be prompted for a file name, a report description, and which data fields need to be printed in the report.

Further details on creating custom reports are beyond the scope of this manual; refer to the software user's manual for additional features.

V. ADMINISTRATIVE

How to Obtain Revised Copies of the Database

The Standards Compendium can be obtained through a written request to the University of Michigan Transportation Research Institute (UMTRI), Marine Systems Division, 2901 Baxter Rd., Ann Arbor, Michigan 48109-2150, or via a phone call to the NSRP Documentation Center at (313) 763-2465.

Making Change Requests

Proposed changes can be made to the Compendium in writing using the form included at the end of this appendix. Changes may take the form of:

1. Additions of new standards

2. Changes to one or more fields included in the current version of the Compendium.

3. Deletions of standards in the Compendium.

4. Changes to the Compendium program and database structure. This would include adding new data fields or different report formats, for example.

Change requests will be reviewed and acted upon based on current funding.

Quick Reference Sheets (for dBASE)

Loading Compendium to Hard Drive

1. Create a back-up of the original diskette
   A. Use the Diskcopy A: A: command for one **drive** systems
   B. Use the Diskcopy A: B: command for two drive systems

2. Uncompress files
   A. Use the command B:\> Pkunzip/d Compend.zip C:\Compend\
   B. This takes the file from drive B and extracts it to directory Compend on drive C.

3. Launch database program
   A. In Windows, double click on program icon
   B. In DOS type exe or bat filename

Searching Compendium

4. Add Compendium to File Catalog
   This must be done to open the compendium and view its contents
   A. Pull down the Catalog menu from the top of the screen.
   B. Select Add File to Catalog. A window will appear on the right side of the screen with a list of directories.
   C. Locate the file Main.DBF in the tree.
   D. Double click on Main.DBF.

5. Double Click in the file Main.DBF under Data
   This will allow you to work with Main.DBF

6. Double Click on Display Data
   The unsorted compendium will then be displayed

7. Transfer to Query Design
   This will allow you to tell dBASE how to sort the Compendium
   A. Pull down the Exit menu from the top of the screen.
   B. Select Transfer to Query Design. The fields of the compendium will then be displayed on a new screen.

8. Enter Search Criteria
   A. Tab to desired field by which to sort
   B. Enter search criteria. Shift+Fl provides a list of additional search keys.
      1. If you wanted to find all standards with HaIon in their title
         a. Tab to the Title field
         b. Type $"halon"
      2. If you wanted to find SWBS numbers greater than 800
         a. Tab to the SWBS field
         b. Type >800
   C. Press F2 once the search criteria have been entered. The list you desired will be displayed.

9. To Perform Additional Searches
    A. Repeat steps 4 and 5 again.

Printing Compendium

10. Transfer to Query Design Screen from the Browse Screen
    A. Pull down the Exit menu from the top of the screen
    B. Select Transfer to Query Design

11. Save search results as a database
    This permits you to recall or print this select list of standards at any time
    A. Pull down the Layout menu from the top of the screen
    B. Select Write View as a Database
    C. Provide a convenient name and description

12. Exit Query Design Screen and return to Control Center
    A. Pull down the Exit menu from the top of the screen
    B. You may abandon your work if you wish only to save the results of the search (they were saved in step 2-B)

13. Activate file you wish to print
    A. Double click on file name under Data
    B. Select Use File

14. Choose print format
    A. Double click on the pre-saved report format you would like to us
    B. Select Print Report
    C. Select Current View

SAMPLE OUTPUT

SWBS	ORGAN	TITLE	STD_NO	STATUS
856	SNAME	Higher Strength Steels in Hull Structures	2-19	
	NAM	H th M		
	N M	s	2-21	
	N M	Qua Reinforced Plastics Structures	2-23	
	N M	B H		
072	SNAME	Ship Vibration and Noise Guidelines	2-25	
856	SNAME	Evaluation Full-Scale Wave Loads	2-26	
856	SNAME	Application of Probabilistic Design Methods to Wave Loads Prediction for Ship Structures Analysis	2-27	
856	SNAME	Bibliography on Slamming Impact and Other Transient Related Phenomena	2-28	
070	SNAME	Design of a Typical Platform Deck	2-8	
070	SNAME	Design of Typical Tanker Shell Longitudinals and Bottom Plating	2-9	
835	SNAME	Marine Steam Power Plant Heat Balance Practices	3-11	
582	SNAME	Guide to the Design and Testing of Anchor Windlasses for Merchant Ships	3-15	
232	SNAME	Recommended Practices for Correcting Steam Power Plant Trial Performance	3-17	
835	SNAME	Marine Diesel Power Plant Performance Practices	3-27	
234	SNAME	Marine Gas Turbine Power Plant Performance Practices	3-28	
234	SNAME	Guide to Centralized Control and Automation of Ship's Gas Turbine Propulsion Plant	3-29	
221	SNAME	Guidelines for the Preservation of Marine Boilers and Boiler Components	3-30	
078	SNAME	Material Specifications Cross Index for Seawater Systems	3-31	
221	SNAME	Furnace Performance Criteria for Gas, Oil and Coal Fired Boilers	3-32	
529	SNAME	Guide for the Disposal of Shipboard Wastes	3-33	
573	DOD	Crates, Shipping, Wood, Open, Wirebound	MIL-C-11133E	A
573	DOD	Crates, wood, nailed, unsheathed domestic shipment, 1500 pounds maximum load (Use PPP-C-650)	MIL-C-11456A	H
573	DOD	Cylinder, Compressed Gas: chlorine; DOT 3AA480 or DOT 3AA480, General Specification	MIL-C-11732D	A
573	DOD	Cylinder, Compressed Gas: ammonia, with valve (DOT 4AA480	MIL-C-11733D	A
421	DOD	Compasses, Ship, Navy, No. 1, magnetic (reflector type, 7 1/2 inch card) and binnacle, reflector type	MIL-C-1193A	A
504	DOD	Clock, quartz crystal, battery powered	MIL-C-1194D	
304	DOD	Cable, cord, and wire, electric; Packaging of	MIL-C-12000H	A
573	DOD	Container assembly, shipping, toxic gases, Type A	MIL-C-12795A	H
573	DOD	Containers: Shipping, fiber tube, spirally wound, telescopic type	MIL-C-12804	A
573	DOD	Crate, Wood, open; maximum capacity 2,500 pounds	MIL-C-13212B	H
665	DOD	Clamps, beam, rigger's	MIL-C-132B	A
573	DOD	Container assembly, sample and specimen shipping	MIL-C-13481B	A
804	DOD	Conversion kit, Barge: deck enclosure design 7006 for designs 231A and 7005	MIL-C-13527	A
804	DOD	Conversion kit, Barge: liquid cargo, design 7009 for 81 FT. nesting barge	MIL-C-13766C	A

SHIP WORK BREAKDOWN STRUCTURE TITLE

Group 0-99 General Guidance and Administration

000	General Guidance and Administration
010	Combat Capabilities (Offensive and Defensive)
011	Air Weapons Vs. Air Targets
012	Air Weapons Vs. Surface Targets
013	Air Weapons Vs. Underwater Targets
014	Surface Weapons Vs. Air Targets
015	Surface Weapons Vs. Surface Targets
016	Surface Weapons Vs. Underwater Targets
017	Underwater Weapons Vs. Surface Targets
018	Underwater Weapons Vs. Underwater Targets
020	Strategic and Special Capabilities
021	Surface Based Deterrents
022	Underwater Based Deterrents
023	Amphibious Warfare
024	Mine and Mine Countermeasure Warfare
025	Inshore Warfare
030	Tactical and Strategic Oper. Support Capabilities
031	Command/Control/Communications
032	Surveillance/Reconnaissance/Intelligence
033	Electronic Warfare and Nuc/Bio/Chemical Defense
034	Logistics/Sealift
035	Other Support
040	Ship System Management
041	Project Management
042	General Administrative Requirements
043	Life Cycle Costing
044	Ship Operation
050	Ship System Performance
051	Ship System Performance Concepts
052	Ship Subsystem Performance Concepts
053	Selected Concepts
054	Component Development
060	Subsystem Characteristics (Interfaces and CNO Cont.)
061	Hull Structure
062	Propulsion Plant
063	Electric Plant
064	Command and Surveillance
065	Auxiliary Systems
066	Outfitting
067	Weapons
068	Integration and Engineering

SHIP WORK BREAKDOWN STRUCTURE TITLE

069	Ship Assembly
070	General Requirements for Design and Construction
071	Access
072	Shock
073	Noise and Vibration
074	Casting, Welding, Riveting, Allied Processes (General)
075	Threaded Fasteners Standards
076	Reliability ad Maintainability
077	Safety
078	Materials
079	Seaworthiness
080	Integrated Logistic Support Requirements
081	Maintenance
082	Support and Test Equipment
083	supply support
084	Transportation and Handling
085	Engineering Drawings
086	Technical Manuals and Other Data
087	Facilities
088	Personnel and Training
089	Training Equipment
090	Quality Assurance Requirements
091	Ship Inspections
092	Ship Tests
093	Combat Systems Checkout
094	Regular Ship Trials
095	Whole Ship Testing
096	Weight Control
097	Inclining Experiment and Trim Dive
098	Models and Mockups
099	Photographs

Group 1 Hull Structure

100	Hull Structure, General
101	General Arrangement-Structural Drawings
110	Shell and Support Structure
111	Shell Plating, Surf. Ship and Submarine Press. Hull
112	Shell Plating, Submarine Non-pressure Hull
113	Inner Bottom
114	Shell Appendages
115	Stanchions

116	Longit. Framing, Surf. Ship and Submarine Press. Hull
117	Transv. Framing, Surf. Ship and Submarine Press. Hull
118	Longit. and Transv. Submarine Non-press. Hull Framing
119	Lift System Flexible Skirts and Seals
120	Hull Structural Bulkheads
121	Longitudinal Structural Bulkheads
122	Transverse Structural Bulkheads
123	Trunks and Enclosures
124	Bulkheads in Torpedo Protection System
125	Submarine Hard Tanks
126	Submarine Soft Tanks
130	Hull Decks
131	Main Deck
132	2nd Deck
133	3rd Deck
134	4th Deck
135	5th Deck and Decks Below
136	01 Hull Deck (Forecastle and Poop Decks)
137	02 Hull Deck
138	03 Hull Deck
139	04 Hull Deck and Hull Decks Above
140	Hull Platforms and Flats
141	1st Platform
142	2nd Platform
143	3rd Platform
144	4th Platform
145	5th Platform
149	Flats
150	Deck House Structure
151	Deckhouse Structure to First Level
152	1st Deckhouse Level
153	2nd Deckhouse Level
154	3rd Deckhouse Level
155	4th Deckhouse Level
156	5th Deckhouse Level
157	6th Deckhouse Level
158	7th Deckhouse Level
159	8th Deckhouse Level and Above
160	Special Structures
161	Structural Castings, Forgings, and Equiv. Weldments
162	Stacks and Macks (Combined Stack and Mast)
163	Sea Chests
164	Ballistic Plating

165 Sonar Domes
166 Sponsons
167 Hull Structural Closures
168 Deckhouse Structural Closures
169 Special Purpose Closures and Structures
170 Masts, Kingposts, and Service platforms
171 Masts, Towers, Tetrapods
172 Kingposts and Support Frames
179 Service Platforms
180 Foundations
181 Hull Structure Foundations
182 Propulsion Plant Foundations
183 Electric Plant Foundations
184 Command and Surveillance Foundations
185 Auxiliary Systems Foundations
186 Outfit and Furnishings Foundations
187 Armament Foundations
190 Special Purpose Systems
191 Ballast, Fixed or Fluid, and Buoyancy Units
192 Compartment Testing
195 Erection of Sub Sections (Progress Report Only)
198 Free Flooding Liquids
199 Hull Repair Parts and Special Tools

Group 2 Propulsion Plant

200 Propulsion Plant, General
201 General Arrangement-Propulsion Drawings
202 Machinery Plant Central Control Systems
210 Energy Generating System (Nuclear)
211 (Reserved)
212 Nuclear Steam Generator
213 Reactors
214 Reactor Coolant System
215 Reactor Coolant Service System
216 Reactor Plant Auxiliary Systems
217 Nuclear Power Control and Instrumentation
218 Radiation Shielding (Primary)
219 Radiation Shielding (Secondary)
220 Energy Generating System (Non-Nuclear)
221 Propulsion Boilers
222 Gas Generators

223 Main Propulsion Batteries
224 Main Propulsion Fuel Cells
230 Propulsion Units
231 Propulsion Steam Turbines
232 Propulsion Steam Engines
233 Propulsion Internal Combustion Engines
234 Propulsion Gas Turbines
235 Electric Propulsion
236 Self-Contained Propulsion Systems
237 Auxiliary Propulsion Devices
238 Secondary Propulsion (Submarines)
239 Emergency Propulsion (Submarines)
240 Transmission and Propulsor Systems
241 Propulsion Reduction Gears
242 Propulsion Clutches and Couplings
243 Propulsion Shafting
244 Propulsion Shaft Bearings
245 Propulsory
246 Propulsor Shrouds and Ducts
247 Water Jet Propulsory
248 Lift System Fans and Ducting
250 Propulsion Support Sys. (Except Fuel and Lube Oil)
251 Combustion Air System
252 Propulsion Control System
253 Main Steam Piping System
254 Condensers and Air Ejectors
255 Feed and Condensate System
256 Circulating ad Cooling Sea Water System
258 H.P. Steam Drain System
259 Uptakes (Inner Casing)
260 Propulsion Support Systems (Fuel and Lube Oil)
261 Fuel Service System
262 Main Propulsion Lube Oil System
263 Shaft Lube Oil System (Submarines)
264 Lube Oil Fill, Transfer, and Purification
290 Special Purpose Systems
298 Propulsion Plant Operating Fluids
299 Propulsion Plant Repair Parts and Special Tools

Group 3 Electric Plant

300 Electric Plant, General

301 General Arrangement-Electrical Drawings
302 Motors and Associated Equipment
303 Protective Devices
304 Electric Cables
305 Electrical Designating and Marking
310 Electric Power Generation
311 Ship Service Power Generation
312 Emergency Generators
313 Batteries and Service Facilities
314 Power Conversion Equipment
320 Power Distribution Systems
321 Ship Service Power Cable
322 Emergency Power Cable System
323 Casualty Power Cable System
324 Switchgear and Panels
330 Lighting System
331 Lighting Distribution
332 Lighting Fixtures
340 Power Generation Support Systems
341 SSTG Lube Oil
342 Diesel Support Systems
343 Turbine Support Systems
390 Special Purpose Systems
398 Electric Plant Operating Fluids
399 Electric Plant Repair Parts and Special Tools

Group 4 Command and Surveillance

400 Command and Surveillance, General
401 General Arrangement-Command and Surveillance
402 Security Requirements
403 Personnel Safety
404 Radio Frequency Transmission Lines
405 Antenna Requirements
406 Grounding and Bonding
407 Electromagnetic Interference Reduction (EMI)
408 System Test Requirements
410 Command and Control Systems
411 Data Display Group
412 Data Processing Group
413 Digital Data Switchboards
414 Interface Equipment

415	Digital Data Communications
417	Command and Control Analog Switchboards
420	Navigation Systems
421	Non-Electrical/Electronic Navigation Aids
422	Electrical Navigation Aids (Incl Navig. Lights)
423	Electronic Navigation Systems, Radio
424	Electronic Navigation Systems, Acoustical
425	Periscopes
426	Electrical Navigation Systems
427	Inertial Navigation Systems
428	Navigation Control Monitoring
430	Interior Communications
431	Switchboards for I.C. Systems
432	Telephone Systems
433	Announcing Systems
434	Entertainment and Training Systems
435	Voice Tubes and Message Passing Systems
436	Alarm, Safety, and Warning Systems
437	Indicating, Order, and Metering Systems
438	Integrated Control Systems
439	Recording and Television Systems
440	Exterior Communications
441	Radio Systems
442	Underwater Systems
443	Visual and Audible Systems
444	Telemetry Systems
445	TTY and Facsimile Systems
446	Security Equipment Systems
450	Surveillance Systems (Surface)
451	Surface Search Radar
452	Air Search Radar (2D)
453	Air Search Radar (3D)
454	Aircraft Control Approach Radar
455	Identification Systems (IFF)
456	Multiple Mode Radar
459	Space Vehicle Electronic Tracking
460	Surveillance Systems (Underwater)
461	Active Sonar
462	Passive Sonar
463	Multiple Mode Sonar
464	Classification Sonar
465	Bathythermograph
470	Countermeasures

471	Active ECM (Incl Combination Active/Passive)
472	Passive ECM
473	Torpedo Decoys
474	Decoys (Other)
475	Degaussing
476	Mine Countermeasures
480	Fire Control Systems
481	Gun Fire Control Systems
482	Missile Fire Control Systems
483	Underwater Fire Control Systems
484	Integrated Fire Control Systems
489	Weapon Systems Switchboards
490	Special Purpose Systems
491	Electronic Test, Checkout, and Monitoring Equipment
492	Flight Control and Instrument Landing Systems
493	Non Combat Data Processing Systems
494	Meteorological Systems
495	Special Purpose Intelligence Systems
498	Command and Surveillance Operating Fluids
499	Command and Surv. Repair Parts and Special Tools

Group 5 Auxiliary Systems

500	Auxiliary Systems, General
501	General Arrangement-Auxiliary Systems Drawings
502	Auxiliary Machinery
503	Pumps
504	Instrument and Instrument Boards
505	General Piping Requirements
506	Overflows, Air Escapes, and Sounding Tubes
507	Machinery and Piping Designation and Marking
508	Thermal Insulation for Piping and Machinery
509	Thermal Insulation for Vent and A/C Ducts
510	Climate Control
511	Compartment Heating System
512	Ventilation System
513	Machinery Space Ventilation System
514	Air Conditioning System
515	Air Revitalization Systems (Submarines)
516	Refrigeration System
517	Auxiliary Boilers and Other Heat Sources
520	Sea Water Systems

521	Firemain and Flushing (Sea Water) System
522	Sprinkler System
523	Washdown System
524	Auxiliary Sea Water System
526	Scuppers and Deck Drains
527	Firemain Actuated Services-Other
528	Plumbing Drainage
529	Drainage and Ballasting System
530	Fresh Water Systems
531	Distilling Plant
532	Cooling Water
533	Potable Water
534	Aux. Steam and Drains Within Machinery Box
535	Aux. Steam and Drains Outside Machinery Box
536	Auxiliary Fresh Water Cooling
540	Fuels and Lubricants, Handling and Storage
541	Ship Fuel and Fuel Compensating System
542	Aviation and General Purpose Fuels
543	Aviation and General Purpose Lubricating Oil
544	Liquid Cargo
545	Tank Heating
549	Special Fuel and Lubricants, Handling and Stowage
550	Air, Gas, and Misc. Fluid Systems
551	Compressed Air Systems
552	Compressed Gases
553	02 N2 System
554	LP Blow
555	Fire Extinguishing Systems
556	Hydraulic Fluid System
557	Liquid Gases, Cargo
558	Special Piping Systems.
560	Ship Control Systems
561	Steering and Diving Control Systems
562	Rudder
563	Hovering and Depth Control (Submarines)
564	Trim System (Submarines)
565	Trim and Heel Systems (Surface Ships)
566	Diving Planes and Stabilizing Fins (Submarines)
567	Strut and Foil Systems
568	Maneuvering Systems
570	Underway Replenishment Systems
571	Replenishment-At-Sea Systems
572	Ship Stores and Equip. Handling Systems

573 Cargo Handing Systems
574 Vertical Replenishment Systems
580 Mechanical Handling Systems
581 Anchor Handling and Stowage Systems
582 Mooring and Towing Systems
583 Boats, Boat Handling and Stowage Systems
584 Mechanically Operated Door, Gate, Ramp, Turntable Sys.
585 Elevating and Retracting Gear
586 Aircraft Recovery Support Systems
587 Aircraft Launch Support Systems
588 Aircraft Handling, Servicing and Stowage
589 Miscellaneous Mechanical Handling Systems
590 Special Purpose Systems
591 Scientific and Ocean Engineering Systems
592 Swimmer and Diver Support and Protection Systems
593 Environmental Pollution Control Systems
594 Submarine Rescue, Salvage, and Survival Systems
595 Towing, Launching and Handling for Underwater Sys.
596 Handling Sys. for Diver and Submersible Vehicles
597 Salvage Support Systems
598 Auxiliary Systems Operating Fluids
599 Auxiliary Systems Repair Parts and Tools

Group 6 Outfit and Furnishings

600 Outfit and Furnishings, General
601 General Arrangement-Outfit and Furn. Drawings
602 Hull Designating and Marking
603 Draft Marks
604 Locks, Keys, and Tags
605 Rodent and Vermin Proofing
610 Ship Fittings
611 Hull Fittings
612 Rails, Stanchions, and Lifelines
613 Rigging and Canvas
620 Hull Compartmentation
621 Non-Structural Bulkhead
622 Floor Plates and Gratings
623 Ladders
624 Non-Structural Closures
625 Airports, Fixed Portlights, and Windows
630 Preservatives and Coverings

631 Painting
632 Zinc Coating
633 Cathodic Protection
634 Deck Covering
635 Hull Insulation
636 Hull Damping
637 Sheathing
638 Refrigerated Spaces
639 Radiation Shielding
640 Living Spaces
641 Officer Berthing and Messing Spaces
642 Noncommissioned Officer Berthing and Messing Spaces
643 Enlisted Personnel Berthing and Messing Spaces
644 Sanitary Spaces and Fixtures
645 Leisure and Community Spaces
650 Service Spaces
651 Commissary Spaces
652 Medical Spaces
653 Dental Spaces
654 Utility Spaces
655 Laundry Spaces
656 Trash Disposal Spaces
660 Working Spaces
661 Offices
662 Machinery Control Centers Furnishings
663 Electronics Control Centers Furnishings
664 Damage Control Stations
665 Workshops, Labs, Test Areas (Incl Portable Tools, Equip)
670 Stowage Spaces
671 Lockers and Special Stowage
672 Storerooms and Issue Rooms
673 Cargo Stowage
690 Special Purpose Systems
698 Outfit and Furnishings Operating Fluids
699 Outfit and Furnish. Repair Parts and Special Tools

Group 7 Armament

700 Armament, General
701 General Arrangement-Weaponry Systems
702 Armament Installations
703 Weapons Handling and Stowage, General

SHIP WORK BREAKDOWN STRUCTURE TITLE

710	Guns and Ammunition
711	Guns
712	Ammunition Handling
713	Ammunition Stowage
720	Missiles and Rockets
721	Launching Devices (Missiles and Rockets)
722	Missile, Rocket, and Guidance Capsule Handling Sys.
723	Missile and Rocket Stowage
724	Missile Hydraulics
725	Missile Gas
726	Missile Compensating
727	Missile Launcher Control
728	Missile Heating, Cooling, Temperature Control
729	Missile Monitoring, Test and Alignment
730	Mines
731	Mine Launching Devices
732	Mine Handling
733	Mine Stowage
740	Depth Charges
741	Depth Charge Launching Devices
742	Depth Charge Handling
743	Depth Charge Stowage
750	Torpedoes
751	Torpedo Tubes
752	Torpedo Handling
753	Torpedo Stowage
754	Submarine Torpedo Ejection
760	Small Arms and Pyrotechnics
761	Small Arms and Pyrotechnic Launching Devices
762	Small Arms and Pyrotechnic Handling
763	Small Arms and Pyrotechnic Stowage
770	Cargo Munitions
772	Cargo Munitions Handling
773	Cargo Munitions Stowage
780	Aircraft Related Weapons
782	Aircraft Related Weapons Handling
783	Aircraft Related Weapons Stowage
790	Special Purpose Systems
792	Special Weapons Handling
793	Special Weapons Stowage
797	Misc. Ordnance Spaces
798	Armament Operating Fluids
799	Armament Repair Parts and Special Tools

Group 8 integration/Engineering (Shipbuilder Response)

800	Integration/Engineering (Shipbuilder Response)
801	Shipbuilders Information Drawings
802	Contract Drawings
803	Standard Drawings
804	Type Drawings
806	Study Drawings
810	Production Engineering
811	Configuration Management
812	Change Proposals, Scoping and Shipchecking
813	Planning and Production Control
820	Special Drawings for Nuclear Propulsion Systems
830	Design Support
831	Construction Drawings
832	Specifications
833	Weight Engineering
834	Computer Programs
835	Engineering Calculations
836	Models and Mockups
837	Photographs
838	Design/Engineering Liaison
839	Lofting
840	Quality Assurance
841	Tests and Inspection, Criteria, and Procedures
842	Trials Agenda Preparation, Data Collection ad Anal.
843	Inclining Experiment and Trim Dive
844	Combat Systems Checkout Criteria and Procedures
845	Certification Standards
850	Integrated Logistic Support Engineering
851	Maintenance
852	Support and Test Equipment
853	supply support
854	Transportation
855	Engineering Drawings and Specifications
856	Technical Manuals and Other Data
857	Facilities
858	Personnel and Training
859	Training Equipment
890	Special Purpose Items
891	Safety

892	Human Factors
893	Standardization
894	Value Engineering
895	Reliability and Maintainability
896	Data Management
897	Project Management

Group 9 Ship Assembly and Support Services

900	Ship Assembly and Support Services
901	901 Thru 979 Reserved for Ident. of Assemblies
980	Contractual and Production Support Service
981	Insurance
982	Trials
983	Delivery
984	Open and Inspect (Conversions Only)
985	Fire and Flooding Protection
986	Tests and Inspection
987	Weighing and Recording
988	Contract Data Requirements (Administration)
989	Fitting-Out
990	Construction Support
991	Staging, Scaffolding, and Cribbing
992	Temporary Utilities and Services
993	Material Handling and Removal
994	Cleaning Services
995	Molds and Templates, Jigs, Fixtures, and Spec. Tools
996	Launching
997	Drydocking